Predicting consumer behaviour in tourism industry: Comparing Structural Equation Modelling (SEM) and multiple regression

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Predicting consumer behaviour in tourism industry: Comparing Structural Equation Modelling (SEM) and multiple regression

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Abstract. The Indonesian creative tourism industry is currently flouring and competitive. In this competitive industry, the industry players' capability to predict their tourist behaviour is imperative. However, research to examine method of predicting tourist behaviour in this industry is limited. This study is designed to assess the applicability of SEM compared to Multiple Regression to predict tourist behaviour. This study uses a survey of 403 tourists from tourism attractions in Bandung. The model of tourist loyalty behaviour was assessed and compared using software AMOS (SEM) and SPSS (Multiple Regression). The results show that the model of tourist behaviour tested by using SEM has a sound Goodness of Fit Index. Further, the coefficient of determination of tourist behaviour in the SEM model is higher compared to that of multiple regression model. In addition, this study confirms the effect of experience quality on tourist behaviour. This study reveals that applying SEM has offered a better prediction on tourist behaviour compared to Multiple Regression. This finding improves the theoretical and managerial understanding on the application of SEM in tourism industry.

1. Introduction

One of the promising tourism sectors is creative tourism [1]. This tourism sector has an important effect on the empowerment of a community and the development of a community's economic, social, and cultural environment. A review of the pertinent literature reveals that there is a lack of studies on creative tourism [2]. The current research on creative tourism attraction is mainly conceptual in nature with less emphasis on tourists' perceptions. Furthermore, although cultural-based tourism is increasing in popularity in the global tourism market, research exploring the tourist experience on tourism creative attractions is sparse.

Scholars suggest that tourist loyalty behaviour toward a tourism destination is an important factor in achieving a competitive advantage for a destination [3-5]. Several researchers have explored how tourists' experience affects their image and loyalty perceptions towards the destination. However, to date, researchers seem to be no conclusion in determining which method is the most suitable to predict tourist behaviour. Some studies rely on conventional multiple regression while recent studies tend to employ structural equation modelling for predicting customer behaviour among complex and related determinant factors [1,6,7]. Successfully identify, manage, and apply the proper method of analysis is

critical factor for managers to develop competitive advantage in a highly competitive tourism marketplace [8].

Thus, empirically examining of how both multiple regression and SEM in predicting tourist behaviour will help fill an important research gap. Exploring such methodological issue in tourist loyalty towards a creative-tourist attraction will make a theoretical contribution to the methodology in creative tourism studies, because it will provide a framework for future research method in this burgeoning area.

2. Method

Structural Equation Modelling (SEM) is a statistical tool used to solve multilevel models simultaneously which cannot be solved by linear regression equations [9]. SEM can also be considered as a combination of regression analysis and factor analysis. SEM can be used to solve the equation model with more than one dependent variable and the reciprocal influence (recursive). SEM is based on covariance analysis, so it gives a more accurate covariance matrix than linear regression analysis [9]. The structural equations of this model can be read from the path diagram as follows:

$$y1i = \gamma 10 + \gamma 11x1i + \gamma 12x2i + \zeta 1i \quad (1)$$

$$y2i = \gamma 20 + \gamma 21x1i + \gamma 22x2i + \beta 21y1i + \zeta 2i \quad (2)$$

$$y3i = \gamma 30 + \gamma 32x2i + \beta 31y1i + \beta 32y2i + \zeta 2i \quad (3)$$

Multiple linear regression analysis is a linear relationship between two or more independent variables with the dependent variable [10]. This analysis is to determine the direction of the relationship between the independent variable with the dependent variable whether each independent variable is related and to predict the value of the dependent variable. The multiple linear regression model is illustrated with the following equation:

$$Y = \alpha + \beta 1\ X2 + \beta 2\ X2 + \beta n\ Xn + e \quad (4)$$

Note:
Y = dependent variable;
X = independent variable,
α = constant,
β = coefficient estimate.

The model consists of five dimension of experience quality as independent variable, consisting of escape, peace of mind, involvement, recognition, and education. The endogenous variable consists of customer satisfaction and customer loyalty (measured with intention to repurchase and recommend). The variables and their indicator are presented in Table 1. To examine the propose mathematical model using SEM and multiple regression, this study uses a survey of 403 tourists from tourism attractions in Bandung. Male respondents are 173 while the female are 230 respondents. Of the respondents, 85% are young tourists (<35 years old), while older tourists (>45 years old) are 10%. In terms of education, most of the respondents (68%) has education of high school or less.

3. Results and discussions

3.1. SEM analysis

The measurement model of the link between experience quality, satisfaction, and loyalty was evaluated by employing confirmatory factor analysis (CFA). In order to make the model fit, the next step modifies the variables by re-parameterizing based on the standardized residual, insignificant path,

and modification index value with theoretical concept consideration [9,11]. This process results that the constructs are valid and reliable, indicated by the value of composite reliability higher than 0.7 and the value of average variance extracted also higher than 0.5 [9]. Following the validity and reliability check, the test of the proposed model was performed to analyse the hypothesized causal paths between variables. The result of the modified model shows that the requirements of goodness-of-fit indexes are satisfied (CMIN/DF: 2.782, CFI: 0.929, IFI: 0.930, and RMSEA: 0.062).

Table 1. Variable, indicator, and estimate.

Variable/Indicator	Estimate	Variable/Indicator	Estimate
Escape (ESC)		**Recognition (REC)**	
- I fee free from my daily life	0.773	- Staff friendly	0.858
- I can forget my routine.	0.759	- Staf *knowledgable*	0.822
- I feel different from my daily	0.693	- Staff servce well.	0.862
Peace of Mind (POM)		- Staff treat me heartfully.	0.821
- Confiirtable.	0.575	- I feel treated as important person	0.799
- Rilex.	0.706	- I feell respected	0.737
- Safe.	0.807	**Education (EDU)**	
- My privacy secure	0.827	- Increase my knowledge.	0.676
- The envirobnment clean	0.778	- Expand my skill	0.831
Involvement (INV)		- Learn Sundanese culture	0.804
- I am involve in pleasre activity	0.841	- Learn something new.	0.81
- I got a unique experience.	0.841	**Customer Satisfaction CS)**	
- I got a new experience	0.738	- I feel satisfied	0.674
- I got something different	0.667	- I experience more than expected	0.684

3.2. Multiple regression analysis

In testing the multiple regression, a common test of the suitability of data for a regression analysis is the absence of detrimental collinearity [10]. To check the level of collinearity, this study applied the Watson statistic resulting a value of 1.989. This value places the data into a "no serial correlation zone" (dU, D, 4-dU, where dU = 1.746, $p<0.01$). To further check for collinearity between the independent variables, this study employed the tolerance statistic (reciprocal of VIF) method. Hair et al. suggest that if any individual variables has value of the tolerance statistic under 0.1, collinearity is present and the variable should be eliminated from the regression analysis [10]. This data had values of the tolerance statistic between 0.2 and 0.8, so the issue of collinearity was not a problem.

Table 2. Comparison of SEM and Regression

Dis	***SEM***			***Multiple Regression***		
	B	**t**	**sig**	**B**	**t**	**sig**
Escape => Satisfaction	0.13	2.238	0.03	0.154	3.418	0.001
Peace of Mind => Satisfaction	-0.188	-2.52	0.01	-0.133	-2.135	0.033
Involvement => Satisfaction	-0.049	-0.701	0.48	-0.059	-0.923	0.357
Recognition => Satisfaction	0.186	3.738	***	0.195	3.677	0
Education => Satisfaction	0.194	2.04	0.04	0.179	2.72	0.007
Satisfaction => Loyalty	1.801	10.115	***	0.971	14.858	***
Satisfaction (R^2)	24.90%			19.20%		
Loyalty (R^2)	71.20%			37.40%		

The result of testing the relationships between the variables using both SEM and multiple regression is depicted in Table 2. It shows that the relationships between the variables tested are consistent between SEM and multiple regression, with only relationship between involvement and satisfaction is not significant, while other relationships are significant ($p<0.05$ and $p<001$). However, looking at the R2

of the satisfaction and loyalty variable of SEM are bigger compared to that of multiple regression (24.9% compared to 19.2% and 71.2% compared to 37.4%), indication that the SEM result offer better prediction explanation of consumer behaviour. Thus, it suggested that the future studies should employ SEM rather than regression for predicting consumer behaviour.

4. Conclusion

This study reveals the usefulness of both SEM and multiple regression for predicting tourist satisfaction and loyalty. However, although both methods offer a similar result in highlighting the important of experience quality on satisfaction and the important of satisfaction in determining loyalty, this study indicates that the explanation power of loyalty using SEM is higher compared to the multiple regression. In addition, using SEM enables a researcher to get a deeper relationship between variable, in terms of direct and indirect relationship between the variables tested. The power of SEM compared to multiple regression suggest that this approach is recommended as the method for predicting tourist behaviour. While this paper reveals methodological important findings, it does have limitation, especially related to the data was gathered from four cultural-based attractions located in Bandung. Further replications of this research in a different in different culture and tourists are recommended.

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